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AUTHOR Laasonen, Raimo J.
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ABSTRACT

The objective of this study was to investigate the emergence of a "mindy" (a unit of mind). The mindy is characterized as an open, organized, discrete, and kinematic mental shape. The study was the sequel to research on the emergence of mental shape (R. Laassonen, 1993). The subjects were 84 students, aged 13 to 16 years and differentiated into age groups, from a comprehensive secondary school. A test battery that involved filling in deleted parts of figures was constructed for variables of former experience, ambiguous information, the croupier process, contour formation, and filling-in. The croupier process is one that separates, sorts, and collects information. The reliability and validity were evaluated, and proved to be reasonable. The velocities of the variables were calculated and the relationships of the variables (cosines) were elaborated with partial correlation coefficients. The results indicated the existence of preparatory and making processes in mindy construction, with the making process being an autonomous one. The study has implications for educational theory construction and practical teaching behavior because the environmental information organization process was the most influential and the making process cannot be affected with interruptions. In addition, there are implications for planning curricula in subject matters, especially the information arrangement aspects emphasized. (Contains five tables and three references.) (Author/SLD)

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An Education Scientific Approach to Origin of Complex and Creative Mindies through Former Experience, Ambiguous Information, Croupier Process, Contour Formation, and Filling-in in 13-16 Years of Age

Raimo J Laasonen
Project researcher
Vihti, Finland

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Raimo Laasonen

Running head: AN EDUCATION SCIENTIFIC APPROACH

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Abstract

The objective of the study was to inquire the emergence of a mindy (a unit of mind). The study was sequel to the emergence of mental shape research (Laasonen, 1993). The subjects were 84 13-16 years old persons from a secondary comprehensive school and they were differentiated into age groups. A test battery was constructed for the variables. The reliability and validity were evaluated and they proved to be reasonable. The velocities of the variables were calculated and the relationships of the variables (cosines) were elaborated with partial correlation coefficient. The results indicated the existence of a preparatory and making processes in the mindy construction. The latter is an autonomous one. The study had implications to educational theory construction and practical teaching behavior because the environmental information organization process was the most influential and the making process cannot be affected with interruptions. In addition, there were implications for planning of curricula in subject matters, especially the information arrangement aspects emphasized.

An Education Scientific Approach to Origin of Complex and Creative Mindies through Former Experience, Ambiguous Information, Croupier Process, Contour Formation, and Filling-in in 13-16 Years of Aged

What kind of motivation lies behind the title that seems to be a quagmire? There are several reasons. An educator has an idea for an educatee(s) that has future references. The teleology of the idea often connects with coping with social environment. The meaning is promote knowhow of taking care of businesses. However, there exist boundary conditions that prevent educational communication between the educator and the educatee(s).

The conditions associate with mind functions because the mystery of mind processes is unsolved, still. There are numerous eminent theories of learning, instruction, and education that easily can be verified in the history of education science. However, the bottleneck of education is the partial knowledge of the functions of mind. That is why it is profitable to tackle the mind problems, directly, the formation of mental shapes, the transformation of mind images, the

organization of the flow of mind activities, etc. According to my knowledge there has been considerable progress in the brain sciences from the materialistic basis of research. A but exists in the same way as a chair is not constructed from adding the material together in the place of mind. It is not likely adding the brain stuff together produces mind because responses to environmental conditions need flexible organization of information processing. Information cannot be reduced to its material basis. So another approach to the problem at hand is to be adopted.

Theoretical Basis of Study

The approach can be characterized as dealing with form bound meanings that include in contour. The first results réferred it is possible to study the emergence of a mind shape without drilling the skull (Laasonen, 1993). The study is sequel to the former paper that dealt with the emergence of a mind shape.

The results indicated the birth of a mental shape is a partial, serial iteration process with parallel subprocesses. Masters and slaves could be differentiated in the process. The elements which were dealt with in the process were open pieces of contour

that include information, defined as form bound meanings. The most important master was the croupier process that separates, sorts, and collects information. The croupier process determines how active, open pieces of contour are slid into each other, what is the purpose of a mental shape, how the shape is filled-in, and the social value of the mental shape. Theoretical elaboration and conceptual translation of the results produced a proposition that has a wider denotation than the mere theoretical result.

The proposition states the croupier process determines the organization of open, discrete mental activities, the purpose of the activities, the assumed social worth of the activities, and the application of information in the mental shape construction. A condition for the emergence of a mental shape is the combination of deprivations in the basic needs (hunger, thirst, sex, and curiosity) which are to remain below its firing thresholds.

As for the storage and reconstruction of the mental shape there is no obstacle for continuing the logic the results indicate. Consequently, it is assumed that the croupier process, in addition to other functions, breaks the mental shape back to open pieces of contour for

the storage into memory and again starting the reconstruction of the shape when needed. In this context, I content myself with the verification of the fact, transformation of the mental shape into a mindy takes place through the processes of sharpening, leveling, condensing, scattering, and rearrangement.

A mindy can be characterized as an open, organized, discrete, and kinematic mental shape. The openness means that it can process with other mindies. The discrete nature of the mindies means that the mindies are differential processes. The kinematics purposes that the mindy is in continuous motion. In the same way as above I can verify that the mindies interact through bursts of firing, diffusion, absorbtion, and assimilation. Furthermore, the mindies are elastic but in interaction they modify into plastic and thereafter back to elastic.

The results of the emergent mental shape study indicated that the economic value configuration produces meanings into the process which the croupier process regulates. In connection with it I applied the term configuration for a more established entity of form

bound meanings. Therefore, three terms have differentiate: a mental shape, a mindy, and a configuration. The prominent feature of the mental shape is vagueness. The mindy has organization as the salient feature. The configuration is a stabilized mindy that resists influence attempts to change it for example attitudes, values, and roles. However, one variable is left which has a crucial position in mind activities, former experience.

It is likely that former experience plays a leading role in mind functions, in the mindy processes. In addition, former experience produces a conservative way of processing information because that is the mode persons use in problem solving (Davies & Ledington, 1988, p. 17). It is possible that former experience leaves traces in the mindies in the same way as Kolb and Whishaw (1985, p.476) present the function of memory in the brain. The authors do not demand to understand the analogy practically. A matter that is clear enough is that former experience cannot be passed by in these research circumstances. In this context, I do not see it sensible to define former experience exhaustively because it presumes a philosophical scrutiny.

A preliminary definition is: former experience is events adopted in a case history. In the same breath a creative mindy can be defined as a novel mindy that is irreversible to earlier mindies. Ambiguous information is information without fixation points. Complexity is a relative concept and is assumed given. The croupier process is the master that regulates mind activities and their outcomes. Contour formation and filling-in are the slaves that produce discrete mindies and release information from contour.

Theoretically, the hypothesis is about a double regulation system where former experience regulates the croupier process that designs ambiguous information with the help of contour formation and filling-in. The transformation of ambiguous information feeds back to the croupier process for the check of processing ambiguous information. The processing produces either complex mindies or creates new mindies. Again, there the modifications feed back to the croupier process for the check of processing and the croupier process continues the design. The croupier process does not act alone, but former experience regulates the functions of the croupier process that feeds back former experience comparing the action with the organization former experience

presumes.

The hypothesis bases on the former theoretical results and the subjective probabilities of the deductions that have potential chances to realize. The realization is a matter of empirical study with the variables: former experience, ambiguous information, the croupier process, contour formation, filling-in, former experience, complex and creative mindies. The variables are processes from ambiguity to a more organized entity of mind.

Method

Test Construction

For measuring the filling-in process ready made figures were selected from a computer program. Parts were deleted from the figures. The same kinds of partial figures were grouped under a same item. So the items included the tasks. The instruction was: The below figures lacks of parts and Your task is to complete the figures. The fill-in test included 12 items. The items included 51 tasks.

The separation and sorting test included 6 items, which were the tasks, too. The items included various figures embedded in different grounds. The number of figures in each item was known. The test was instructed: How many different kinds of figures you find below?

The collection process test was constructed sorting figure grounds into pieces and scattering them around in the frame. The instruction was: Which parts of the figures belong together? Mark the same pieces with the same numbers.

The complexity test included one item and simultaneously one task. The item included a line figure with 19 different parts joined. The task was instructed: There is a drawing below and Your task is to draw a copy of it into the empty frame below the figure.

The contour formation test also included 6 items = 6 tasks. Every item had a complex figure without possibilities to draw a countour around the figures, unanimously. The test was instructed: There is six figures below and Your task is to draw countour around the figures.

The creativity test was of a production type with starting points for free developing. The test had 6 items = 6 tasks. The instruction was: There is six figures below which include the initials of the figures and Your task is to draw figures from the initials. You can draw whatever you want.

The ambiguous information test included 1 item with 8 tasks. From the original figures parts were removed in the way it was impossible to deduce the

original figure from their parts. The test was instructed: There is 8 parts of a figure below and Your task is to name the figures on the lines below the parts of the figures.

The scoring of the fill-in test took place giving 1 score for every filled-in answer, except in the place of the item faces where there were to dark persons. If the darkness was taken into account then 2 scores. The separation and sorting test was scored as such or the number of figures seen. The collection test was scored giving 1 score for every right joining of the figure pieces. The complexity was scored giving 1 score for every right piece of line that was replicated in the figure. The contour formation test was scored with 2 scores if the figure was of right shape and had closed contour. If the figure was right shape with open contour then 1 score else 0. The creative mindies drawings got 2 scores if meaning and novelty were included in the figures. The mere meaning produced 1 score else 0. The ambiguous information task produced 2 scores if the guess was right and it had meaning (name). The mere meaning produced 1 score else 0.

Former experience was derived from the scores of the creative mindies and ambiguous information tests. The creative solutions were subtracted from the total

score of the creative mindies and the named tasks of the ambiguous information test were included in former experience. The scores were added to present former experience.

Subjects

The subjects were 13-16 years old children from a secondary comprehensive school. The subjects came from the same school district. There were 20 13-years old, 34 14-years old, 24 15-years old, and 8 16-years old persons. The data were obtained during the lessons and the answering lasted from 30 to 45 minutes. No disturbing behavior occured during the testing

Variable Construction for Analysis

The test battery included 86 separate tasks and the answering lasted 30-45 minutes. The range mark was calculated (1800 sec + 2250 sec)/2 and it was divided by 86 that resulted in about 26 sec for a completion of a task. The task time was multiplied by the number of tasks in the item that produced the item time which was converted into minutes with mathematical rounding. The scores of the items were added into a sum score. In the place of 13-years old the fill-in items 3 and 4 were deleted because of missing information. The sum scores of the measures were divided by the total time of the measures that

resulted in the velocity of the variables. The velocities are necessary because of the function of variables in mind and for calculations of the order of influences between the variables. Thus the statistical variables are the velocities of the subjects in the columns of the data matrices in the age groups. In the screening of the data it was obvious that some tests had to be excluded because of deficient answering. The final number of subjects were 19 13 years old, 33 14-years old, 24 15-years old, 14 8 16-years old.

Results

The test battery was "home made." So it was necessary to assess the reliability and validity of the measures for the sake of the credibility of conclusions.

Reliability

Usually, reliability is defined as an ability of a measure to resist randomness. In this context the evaluation reliability took place from a different angle. The starting point was the maximum performance in a test. Thus if every subject attains the maximum score then in a probabilistic sense the case is a certain event. It means also maximum reliability because there is no error, randomness, or noise. All the deviations from the maximum values

increase uncertainty and so lower reliability. Consequently, reliability can be examined through deviations from the maximum values in the sense of least squares. The procedure was implemented in the next way.

The maximum values of the measures were calculated and scaled that resulted in ones for every subject. Thereafter the ones were added for obtaining the greatest possible values that can be attained in a test. The empirical values were subtracted from the maximum values, squared, and scaled. The empirical scaled values were added to obtain the squared sum of deviations, or errors. The squared sum of deviations was divided by the maximum value that gave the quotient of errors and maxima.

However, the greatest possible value reliability can have is one. So the quotient has to be subtracted from the one. The operation gives the reliability coefficient. Putting the outcome of the procedure into a formula gives $r_{ii} = 1 - (\sum d^2 / \sum x_{max})$.

Insert Table 1 about here

Table 1

Reliability Coefficients in Age Groups

Age	13	14	15	16
Variable				
Former experience	.94	.96	.99	.95
Separation and sorting	.44	.52	.70	.65
Collection	.77	.77	.93	.78
Contour formation	.89	.90	.92	.77
Fill-in	.89	.90	.91	.96
Ambiguous information	.90	.93	.98	.90
Complex mindies	.65	.74	.72	.74
Creative mindies	.85	.96	.96	.89

The reliabilities are rather tolerable, except separation and sorting in the second row. The measure produces over-and under evaluation of the number of figures that weakens the reliability.

Validity

In the place of validity the structural view was adopted. The variables were normalized and the transpose of the normalized matrix was premultiplied with the normalized matrix. The operation produced a symmetric square matrix with the cosine values between the variables. The cosines were converted into angles and the matrices of the age groups were subtracted from each other, 16–15 year, 15–14 years, and 14–13 years. After it the differences were added and divided by the sum of angles in the former age group, multiplied with 100 that resulted in the percentage of change in the location of the variables. The way of thinking was if changes occur between the age groups then the battery has age specificity and it measures variables not common in different ages, otherwise the battery has structural validity. Accordingly, the battery is not sensitive to uniqueness and specificity of age and it can be thought to measure what it is to measure.

Insert Table 2 about here

The rough comparison of the cosines of the age groups shows that there are no great changes from age group to age group. The change of the angles of the variables from 13 years to 14 years is -7% that cannot be considered significant. In the same way the change of the locations between 14 and 15 years is -18% that does not alter the wholeness. The last change between 15 and 16 years is 16% and the wholeness of the variables can be characterized as stable because of the fewer changes. As an entity the verification of structural validity is established.

Relationships of Variables

The stable nature of the variable locations warranted for the analysis in the whole time span with the method of elaboration (Rosenberg, 1968, p. xiii). Shortly put, elaboration means putting a variable(s) constant and observe the changes between the other variables. Before elaboration the upper triangular cosine matrices of the age groups were added and the cell values were divided by 4 because the mean value is

Table 2

Cosine Matrices of Age Groups

Age	13
1.Former experience	.75.88.94.96.99.87.97
2.Separation and sorting	.75.64.74.72.57.72
3.Collection	.84.91.84.87.91
4.Contour formation	.95.91.86.95
5.Fill-in	.92.85.96
6.Ambiguous information	.87.95
7.Complex mindies	.89
8.Creative mindies	-
Age	14
1.Former experience	.84.88.95.96.99.87.99
2.Separation and sorting	.75.85.81.84.68.82
3.Collection	.86.87.87.79.88
4.Contour formation	.91.94.79.94
5.Fill-in	.95.88.96
6.Ambiguous information	.87.98
7.Complex mindies	.88
8.Creative mindies	-
Age	15
1.Former experience	.88.97.97.96.99.88.99
2.Separation and sorting	.84.88.86.88.80.87

(Table 2 continues

	19
3.Collection	.93.94.97.84.96
4.Contour formation	.95.96.88.97
5.Fill-in	.96.89.96
6.Ambiguous information	.87.98
7.Complex mindies	.89
8.Creative mindies	–
Age	16
1.Former experience	.89.86.95.97.98.91.97
2.Separation and sorting	.79.88.90.88.86.86
3.Collection	.78.92.80.73.89
4.Contour formation	.93.94.85.92
5.Fill-in	.94.85.96
6.Ambiguous information	.90.92
7.Complex mindies	.89
8.Creative mindies	–

the most probable value.

The formula of partial correlation with three variables was selected as the device for elaboration. In every triplet the slowest variable was the dependent variable and the two others functioned as test factors. In this way a quick part and a slow part formed in the process of construction of mindies. In principle, it is indifferent what kind of formalism is applied because the same relationships emerge with correlations and cosines.

In addition, it was necessary to calculate the mean velocities of the variables to every age group and thereafter the means of the means because the relationships were studied in the whole time span. The variables had their maximum velocities and the means of the means were subtracted from the maximum velocities to have the order of the velocities for the interpretation. The velocities are expressed as percentages from the maxima. The initial matrix for elaboration is in Table 3.

Insert Table 3 about here

Table 3

Initial Situation of Elaboration

Variables

1.Fe	.84	.89	.95	.96	.98	.88	.98
2.SeSo		.78	.81	.82	.83	.72	.81
3.Co			.85	.91	.87	.80	.91
4.CoFo				.93	.93	.84	.94
5.Fi					.94	.86	.96
6.AmIn						.87	.95
7.CoMi							.88
8.CrMi							—

Note. Fe = Former experience; SeSo = Separation and sorting; Co = Collection; CoFo = Contour formation; Fi = Fill-in; AmIn = Ambiguous information; CoMi = Complex mindies; CrMi = Creative mindies.

To have organization in elaboration the variables were sorted in the decreasing order of velocity. The influence pairs of the variables were listed from the quickest ones to the slowest ones. Thereafter the quick and slow parts were joined to form an influence net. The orders of the variable velocities were: separation and sorting = 292%; contour formation = 100%; collection = 80%; complex mindies = 68%; fill-in = 66%; former experience = 66%; creative mindies = 66%; ambiguous information = 54%. The quick and slow effects after elaboration can be seen in Table 4.

Insert Table 4 about here

The complex mindy is not a dependent variable and that is why the term is replaced with complexity that corresponds better with reality. In the same way the number of creative mindies was 19 out of 504 and so there is no reason to speak of creative mindies but only mindies.

The total process of mindy construction differentiated into two parts. The first part can be called a preparatory process and the latter one a making process. The reasons become evident in the conclusions but before the inferences, the

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Table 4

Quick and Slow Effects Variables in Decreasing Velocity order

Quick	Slow
SeSo——>Co	CoFo——>Co
SeSo——>Fi	CoFo——>F
SeSo——>ComX	Co——>Fi
SeSo——>CoFo	Co——>Fe
CoFo——>Co	ComX——>AmIn
CoFo——>Fe	ComX——>CrMi
CoFo——>Fi	Fe——>Fi
CoFo——>ComX	Fe——>AmIn
Co——>Fi	Fe——>CrMi
Co——>ComX	Fi——>AmIn
ComX——>Fe	Fi——>CrMi
ComX——>Fi	Fi——>Fe
ComX——>CrMi	CrMi——>Fe
Fe——>AmIn	CrMi——>Fi
Fi——>AmIn	CrMi——>AmIn

Note. Fe = Former experience; SeSo = Separation and sorting; Co = Collection; CoFo = Contour formation; Fi = Fill-in; AmIn = Ambiguous information; ComX = Complexity; CrMi = Creative mindies.

differences of the variable velocities were calculated to find the events along time.

Insert Table 5 about here

Discussion

The hypothesis falsifies and something else is obtained than expected. The situation is not a rare one in educational studies. However, before the proper conclusions a conceptual clarification has its place here.

Previously, information was defined as form bound meanings. The form of a mindy is open, discrete, elastic, and kinematic as stated before. The meaning of a mindy comprises (a) cognitive part that conveys the relationship with reality (b) directive part that conveys the order of procedure, and (c) emotional part that conveys the affective orientation. The parts are entangled as a whole and they can be extracted from each other only conceptually.

The conclusions are in the rows of the matrices downwards in Table 5 and keeping in mind the velocities of the processes. Furthermore, mind is comprehended as a process that utilizes the processes of its own for producing mental shapes, mindies or

Table 5

Scaled Differences of Velocities in Mindy Process

Preparatory process

	SeSo	CoFo	Co	ComX	Fe	Fi	Ms	Ai
SeSo		.84	.93	.99		1.00		
CoFo			.08	.14	.15	.15		
Co				.05		.06		
ComX					.00	.00	.00	
Fe								.05
Fi								.05
Ms								
Ai								

Making process

	SeSo	CoFo	Co	ComX	Fe	Fi	Mi	Ai
SeSo								
CoFo			.08			.15		
Co					.06	.06		
ComX							.00	.06
Fe						.00	.00	.05
Fi					.00		.00	.05
Mi					.00	.00		.05
Ai								

Note. SeSo = Separation and sorting; CoFo = Contour formation; (Table 5 continues

Table 5

Scaled Differences of Velocities in Mindy Process

Note. Co = Collection; ComX = Complexity; Fe = Former experience; Fi = Fill-in; Ms = Mental shape; Mi = Mindies; Ai = Ambiguous information

unit processes, and configurations. The main finding of the study is the mindy construction differentiates to two subprocesses, the preparatory process and the making one. The processes are hierarchically organized according to the velocities. The preparatory process is serial, whereas the making process includes a parallel part that works up the mindies and their application, properly. The quick process is the preparatory one.

The preparatory process begins when separation-and sorting glances over and arranges the meanings which are needed for the construction of mindies. The processing delays and it takes time compared with the speed of other processes. Thereafter separation-and sorting delivers the organized meanings to contour formation as bursts in a computer language sense. Contour formation selects the pieces of contour that are necessary for the construction of mindies along the meanings. After it separation and sorting contacts with collection with the meanings. Collection begins to process the joining of the pieces. Third, separation-and sorting communicates the meanings to complexity process that starts. Fourth, separation-and sorting conveys the meanings to fill-in that sets going.

After contour formation has selected the

necessary pieces, it informs collection about the pieces first, then complexity, and after them former experience and fill-in, simultaneously. Collection spurts out design of the piece joining to complexity first and after it to fill-in. Complexity process and fill-in are the junction processes. Complexity absorbs and assimilates the information from the above processes and produces the mental shapes. In addition, complexity conveys the mental shapes to former experience, simultaneously. Third, complexity bursts out the mental shapes to fill-in for the release of information from the contours, again simultaneously. Finally, former experience and fill-in project the assimilated information from the upper processes into ambiguous information. Thus ambiguous information is interpreted according to the assimilation of information from the associations of other processes.

The making process has a different nature compared with the preparatory one. Separation-and sorting does not participate with the working through the mindies. The making process functions autonomously and as closed. So there is difference between the data processing and the construction of mindies: Interruptions are not likely in the mindy processing. Contour formation continues to associate

meaningfully with collection first and then with fill-in. It feeds both of them with bursts of the piece of contour. Collection contacts with former experience and fill-in with the transforming design of the joining the pieces of contour, simultaneously. Thus there is modification going on. Complexity continues to transform the mental shapes, after it ambiguous information from the basis of assimilation of former information. However, the simultaneous feedback loops between former experience, fill-in and the mental shapes produce the mindies. This is the parallel part of the making process. Former experience modifies fill-in and the mental shapes. Both former experience and fill-in determine what kinds of mindies are produced, finally. The processing of mental shapes into the mindies feeds back to former experience and fill-in to inform about the transformation of the mental shapes. The outcome is the mindies which are open, organized, elastic and kinematic by form including meaning released from contour.

The additional result is the processes of the feedback loops apply their meanings to ambiguous information, simultaneously. Information is interpreted according to the construction of the mindies. Before moving a more theoretical

examination it is time to ponder the processing of contour. Quite clear is contour formation is a real event and the construction of mindies has much to do with the pieces of contour. The problem is: How the associations form on the level of contour? Is the formation of contour of a mindy analogical or digital? The easy answer to the questions is analogical processing because drawings, writings, and other kind of productions can be regarded as projections of the mindies. A but exists, how do the analogies emerge.

A more real answer is that processing of the pieces of contour is digital with rising and declining edges of the contour form. The similarity with transformation of wave form in digital technique is evident. Accordingly, the processes that participate with the construction of mindies are a kind of sequence circuits which modify bursts of information into a more organized output for the processes after. The modification takes place triggering off the inner "logic" of the processes that add their meanings to the flow of information through the involved processes into ready mindies. The digital way is also a more natural way to scrutinize transformation of form bound meanings because neuron circuits can be studied with binary

relations. Bursts of meanings are fired or not fired for on absorbtion, association, and assimilation of information in neural net.

The study includes a few implications to educational theory construction. One of them is an educator (in its wide extension) has rather limited chances to affect the mindy construction of an educatee(s) because the making process is autonomous. It is likely that didactical procedures are to be concentrated on the preparatory process and especially, separation-and sorting of environmental information because the main master has a crucial position for the function of other processes. The condition implies a strong constraint to educational theory construction because a belief exists that during action in classrooms the processing of information can be guided. Along this study the guidance is waste of time because interruptions do not affect the making process.

To find a constraint for educational theory construction is a releasing factor because need for grand scale theories fades. Furthermore, there is no need for general theory construction at the cost of contents which is a matter of meanings. The study has also implications for teaching in praxis. In real educational

, instructional situations the most important processing is arrangement and organization of environmental information before action. That is because of the centrality of separation-and sorting process that functions erroneously but very influential with other processes. The essential point is that the organization processes are such kind of that allow to the cognitive, directive parts of meaning possibilities to realize. Affective part is with in every case. Thus in front of novel and ambiguous information the phases of beginning are crucial. During lessons it is necessary to use time enough for important features of things, their classification and arrangement before transferring into implementation.

For example, in geography the educator can feature a certain region, to observe the region from various angles, from air, sea, as a cross-section, etc. He or she can instigate the educatee(s) to invent the angles of their own and to present them as outputs of their organization. After this the drawing of own maps may be more sensible.

In mathematics the arrangement of calculation can be emphasized and to indicate some manners of organizing

calculations which can be experimented before the proper exercises.

The study has to do with curriculum, too. The curricula often are normative and strict. The thing is based on beliefs of decision makers, of the ones who act as satellites around them, and of civil servants. However, the autonomous nature of the making process makes questionably other curriculum "should-bes", except the ones that are at the beginning of novelties in subject matters. Thus the spiral principle for the widening and making knowledge deeper is ridiculous, because the novel, ambiguous information is interpreted along the already emerged mindies which former experience guides. Evidently the educatee(s) is/are not blocks of clay where one can add new blocks,in a clockwork way. That is why it is important to build down the dogmatic, narrow-minded organizations of curricula and replace them with more flexible ones that have something to do with reality and not with societal fairy tales. So it is enough to present a variety of arrangements of subject matters for the educatee(s).

Dealing with the croupier process of the subjects I can notify that it is not organized as in adults (Laasonen, 1993). There are differences

between the adult forehand organization of environmental information and the young persons of the study. The prominent difference is the lack of loop between separation-and sorting and collection in the present study. Whereas the connection between the subprocesses of the croupier is very near in adults and there is looping when mental shapes are constructed. Thus the croupier process probably develops after 16 years of age and it needs many-sided experience about environment and its action.

As to the solution of the original problem it got a preliminary solution, although serendipitious. The process of the study form an organized entity for the construction of mindies and that is the solution. On the other hand, surprising is that between years 13-16 there is no developing dynamics in the mindy construction. Instead there is channeling of mind and leaning on former experience in new situations or rigidity of mind processes. The matter implies great difficulties for educational innovation and change for the better future.

Evaluation of one's own contribution is self-satisfied but something can be said of fertility of the study. Probably the contributions are the finding

a constraint for educational theory and practice. Second, the study brings in sight the conservative nature of young persons which restrains the emergence of dynamic thinking because educational behavior based on traditions does not produce adaptive behavior to new environmental situations. Furthermore, conservatism produces maintenance learning which in changing novel situations does not offer means of coping with environment. Accordingly, there is much room for didactical dynamics which appears to be a white area in real settings.

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